



Authorizations and Permits for Protected Species (APPS)

File #: 13430
Title: northwest pinniped assessments
Modification: 3

Applicant Information

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Project Information

File Number:	13430
Application Status:	Application Complete
Project Title:	northwest pinniped assessments
Project Status:	New
Previous Federal or State Permit:	782-1702
Permit Requested:	<ul style="list-style-type: none">• MMPA Research/Enhancement permit
Where will activities occur?	Oregon (including Columbia River and offshore waters) Washington (including Columbia River and offshore waters)
Research Timeframe:	Start: 02/18/2010 End: 01/31/2020
Sampling Season/Project Duration:	sampling and surveys to be conducted year round depending on project
Abstract:	The Marine Mammal Protection Act (MMPA) directs the National Marine Fisheries Service (NMFS) to monitor the recovery of pinniped populations and to define their role in the ecosystem. To meet this mandate, the National Marine Mammal Laboratory, Washington Department of Fish and Wildlife, and Oregon Department of Fish and Wildlife request a research permit to investigate the abundance and distribution, disease, contaminant loading, life history parameters, genetics, and foraging ecology of Pacific harbor seals (<i>Phoca vitulina</i>), California sea lions (<i>Zalophus californianus</i>), and northern elephant seals (<i>Mirounga angustirostris</i>) found in Washington, Oregon and adjacent waters. Up to 30,000 harbor seals, 8,000 California sea lions, and 100 elephant seals may be incidentally taken up to 30 times annually during aerial, boat and ground surveys. Up to 250 Steller sea lions (<i>Eumetopias jubatus</i>) may be incidentally

taken up to 20 times during aerial and boat surveys. Up to 100 killer whales (*Orcinus Orca*) may be incidentally taken up to 2 times during playback experiments. Up to 20,000 harbor seals, 8,000 California sea lions, and 100 elephant seals may be taken incidentally during captures, scat collections and dead pup surveys. Up to 750 harbor seals, up to 600 California sea lions, and up to 50 northern elephant seals may be taken annually by capture; tagging, branding or dye-marking; physical restraint or gas anesthesia; instrumentation; tissue biopsy; tissue and/or blood sampling; milk sampling. Up to 500 California sea lions may be taken during acoustic playback experiments. Requested duration of this permit is 5 years from October 2009 to September 2014

Project Description

Purpose: (a) Project 1. Abundance and distribution of harbor seals
Hypothesis 1. Harbor seal populations in Oregon and Washington are stable
Surveys of harbor seals have been conducted cooperatively by WDFW, ODFW, and NMML in Washington and Oregon since the mid-1970s using a variety of aerial and ground survey techniques (Beach et al. 1985, Brown 1988, Harvey et al. 1990, Huber 1995). Survey results have provided the necessary baseline population data required for estimating Potential Biological Removal (PBR) and Optimum Sustainable Population (OSP) levels under the MMPA (Jeffries et al. 2003). Survey data collected 1974 to 1999 indicated that harbor seals in Washington and Oregon have reached OSP (Brown et al. 2005, Jeffries et al. 2003). Continued survey effort will be required to understand normal fluctuations in a stable population for management of these species. Surveys may take place 1 to 4 times per month year round to access variation in numbers by season and location. Under the management regime proposed by NMFS to govern the incidental take of marine mammals in commercial fisheries (NMFS 1992), regular monitoring of population numbers is necessary to determine if any changes in population status or health have occurred. Collection of census data is also necessary for preparation of required stock assessment reports for this program.

Project 2: Food habits and foraging ecology of harbor seals
Hypothesis 2a: The age and sex-specific foraging ecology of harbor seals has not changed as the population has increased
After exponential growth since passing of the MMPA in 1972, Washington and Oregon harbor seal stocks have recently shown signs of slowed population growth (NMFS 2005); however many fish species are in steep decline (Taylor 2004, PSAT 2007). We believe harbor seals are unquestionably affected by dramatic shifts that have occurred in their prey base along the Pacific west coast and Puget Sound. The objective of this study is to understand the importance of these prey species in the diet of harbor seals using food habits analyses and compare it to historical data. We believe the role of seal and sea lion predation in structuring marine ecosystems and affecting recovery of depressed fish stocks is a critical management issue (NMFS 1997) and has not been fully addressed in Washington and Oregon ecosystems. We propose to collect new harbor seal foraging ecology data using instruments (VHF, acoustic, satellite, time depth recorder and stomach temperature recorder) to construct mechanistic and ecosystem models to aid in the development of ecosystem-based recovery and management strategies in Puget Sound. We propose to examine fatty acid signatures and stable isotopes to aid in describing diet over multiple time frames. We expect that their diet may have changed and consequently their foraging behavior may have shifted in response. We also expect possible changes in home range size and foraging "hot spots" as animals alter their foraging behavior temporally and spatially.

Scat collection. We will collect scat samples from Oregon and Washington haul out sites to determine food habits of harbor seals. Collections may take place 1 to 4 times per month year round to detect variation in diet seasonally and by location. Diet data provide critical information on how harbor seals are using the ecosystem and are necessary for interpretation of data collected from instruments. All age and sex categories from the Washington and Oregon coastal stock and from the Washington inland stock will be incidentally harassed during scat collections.

Capture and restraint. We will capture up to 750 harbor seals at Oregon and Washington haul out sites to achieve the desired age and sex stratification for the studies described below. All captured animals will be physically restrained, sexed, measured, flipper tagged, swabbed and have blood drawn. Some animals will have additional procedures for the specific studies described below. All age and sex categories from the Washington and Oregon coastal stock and from the Washington inland stock will be incidentally harassed during capture.

Blood sampling. Blood samples will be taken for stable isotope analysis (hypothesis 2 a), blood chemistry, immunology, genetic profiles and contaminant work (hormones (thyroid: T3 and T4) and vitamins (e.g. Vitamin A) hypothesis 2 b. Blood samples from harbor seals will be collected from the extradural intravertebral sinus as described by Geraci and Smith (1975) and Dierauf and Gulland (2001).

Blubber, muscle and skin biopsy. Fatty acids are the main component of most lipids, and unlike other nutrients, such as proteins that are readily broken down during digestion; fatty acids are released from ingested lipid molecules (e.g. triacylglycerols) during digestion, but are not degraded (Iverson 1993). In marine organisms, fatty acids are commonly composed of chains of 14-24 carbon atoms. They normally remain intact through digestion and pass into the circulation and are generally taken up by tissues in their intact state and stored in adipose tissue. Although some metabolism of fatty acids occurs within the predator, such that the composition of predator tissue will not exactly match that of their prey, fatty acids can be deposited in adipose tissue with little modification and in a predictable way (Iverson 1993, 1995, Iverson et al. 2002).

Fatty acid profiles in harbor seal blubber can provide information about diet over several weeks (Iverson et al. 1995) and may capture periods of time when sample collections are not possible thereby providing a more complete picture of year-round diet. Comparisons of scat and fatty acid signatures has been used previously (Ridoux et al. 2007) and analyses of fatty acids in harbor seals and their prey in other areas have shown differences in habitat use and foraging on small and large spatial scales in Prince William Sound and the Gulf of Alaska (Iverson et al. 2004).

A complete cross section biopsy of blubber from skin to muscle will be taken. Blubber is not homogenous throughout its depth in phocids because the inner layer responds more rapidly to a shift in diet (Iverson et al. 1997). This technique is consistent with similar studies (Iverson et al. 1997, Walton et al. 2000, Walton and Pomeroy 2003, Bradshaw et al. 2003). Laboratory analyses will be conducted in cooperation with John Kennish (University of Alaska Anchorage). Sampling of blubber for fatty acid analysis will provide data on foraging ecology to enhance present studies using scat analysis. Results from scat analysis give only a snapshot of food consumed in the last 24 to 48 hours. Fatty acid profiles in top-level marine carnivores are influenced strongly by the distinctive fatty acid profiles of their prey species (e.g., Rouvinen and Kiiskinen 1989, Grah- Nelson et al.

1993, Iverson et al 1995, Iverson et al 1997, Kirsch et al. 2000, Iverson et al. 2002) indicating a feeding history of several months.

As examination of fatty acids in pinnipeds as indicators of diet is a recent development, sufficient data are not available to perform a power analysis or calculate minimum sample sizes for determining diet composition.

However, in the Iverson et al. (1997) analyses of fatty acid signatures in the blubber of harbor seals in Prince William Sound, Alaska, 94.8% accuracy was found in detecting differences in diet based on major haulout locations. Assuming that fatty acid signatures in the blubber of Washington and Oregon harbor seals demonstrate similar variability ($CV < 10\%$), we estimate a sample size of 30 animals (male or female, adult or subadult) per area per year would provide precision to detect differences in fatty acids among location groups. Because the fatty acid signatures of suckling or recently weaned pups primarily reflect milk consumption, pups will not be considered for fatty acid analysis. Fatty acid sampling may be done in up to 6 areas each year.

Instruments – Satellite, Time depth recorders, VHF radio tags, acoustic tags. We will instrument subadult and adult harbor seals in Puget Sound and coastal Oregon to describe their foraging behavior. The instruments will be satellite tags, time depth recorders (TDR), VHF radio tags, acoustic tags or stomach temperature sensor tags deployed alone or in combination (no more than 3 instruments on an animal). Each of these tags offers a different view of how the animals use their habitat and the characteristics of the habitat. We plan to instrument up to 60 harbor seals per year with time depth recorder (TDR) or satellite telemetry packs to determine foraging ecology. Ten harbor seals (adult or subadult, male or female) per 6 locations will give a representative sample to determine if foraging behavior differs between males and females and among locations. Pups will not be instrumented. As a pilot study, we consider these to be minimal, but realistic, numbers considering the expense of the instruments.

Up to 150 acoustic and/or VHF radio tags will be applied annually to all age classes except unweaned pups and near term females. These instruments will be used to determine broad and fine scale foraging movements and/or abundance correction factors and these sample sizes will enable us to detect variation among seasons, locations, and age classes (Huber et al. 2001).

VHF radio transmitters will be attached to temple cattle ear tags (51 x 16 x 26 cm; total weight up to 35 grams) and applied to the hind flippers or attached directly to pelage using adhesives (Devcon 5-minute epoxy or Loctite Super Bonder 422 or similar adhesive). TDR units will be comparable to models manufactured by Wildlife Computers, Redmond, WA. They are 2.9 cm in diameter and 15.4 cm long, and do not exceed 196 grams in weight. TDRs will be applied to the pelage using Devcon 5-minute epoxy or similar adhesive. Acoustic tags (e.g., V16: 9 g, 16 by 55 mm, 69 kHz, 152 dB re 1 μ Pa at 1 m; Vemco, Nova Scotia, Canada) will be attached directly to pelage using adhesives (Devcon 5-minute epoxy or Loctite Super Bonder 422 or similar adhesive). These application techniques have been used successfully on a variety of pinnipeds, including harbor seals, California sea lions and northern elephant seals (Stewart et al. 1989, DeLong and Stewart 1991, Wright 2007).

Satellite-linked transmitters will be comparable to models manufactured by Wildlife Computers, Redmond, WA. The transmitter used for harbor seals will be 0.25 watts (11 x 4.5 x 2.3 cm; up to 170 g). Attachment of telemetry and TDR units to the pelage with adhesives was developed by the principal researchers and allows for the loss of instrument packs during the annual molt.

Instruments – Stomach temperature transmitter and stomach temperature recorders. We propose to instrument up to 20 harbor seals per year (excluding pups and near term or lactating females) with a stomach temperature transmitter (STT) and a radio receiver with an integrated microprocessor data logger (HTR) to determine feeding bouts in free ranging harbor seals in the inland waters of Washington and British Columbia, Canada.

Identifying foraging events in marine predators has historically been very difficult because they often forage over large spatial scales and typically feed underwater while diving (Austin et al. 2006a). New technologies, including stomach temperature telemetry along with satellite/GPS and time-depth recorder instruments, have made it possible to identify feeding frequency and locations of free-ranging marine predators (Harwood and Croxall 1988, Austin et al. 2006a, 2006b, Kuhn and Costa 2006). Stomach temperature telemetry allows biologists to identify feeding events, even while diving, by documenting changes in stomach temperature (Austin et al. 2006a, 2006b, Kuhn and Costa 2006). Detection of feeding events is based on the assumption that the body temperature of ectothermic prey in a marine environment is lower than that of its endothermic predators, resulting in a drop in stomach temperature following a feeding event (Hedd et al. 1996, Gales and Renouf 1993). Stomach temperature telemetry has been used successfully with multiple free-ranging seabird species, but has been limited in marine mammals due to the short retention time of the transmitter in the stomach. To lengthen the amount of time the STT remains in the stomach of the animal, we will place each STT pill into a piece of non-toxic, biodegradable ethafoam that digests in 7-10 days. Captive studies with harbor seals (Bekkby and Bjørge 1995), harp seals (*Phoca groenlandica*) (Gales and Renouf 1993), and Steller sea lions (*Eumetopias jubatus*) (Andrews 1998) have identified stomach temperature telemetry as a reliable method for identifying feeding events and separating those events from water ingestion. This technology shows great potential for examining foraging patterns in free-ranging pinnipeds.

The stomach temperature telemetry system consists of two separate instruments: a stomach temperature transmitter (STT, 32 g) placed in the stomach of the seal, and a radio receiver with an integrated microprocessor data logger (HTR) that will be glued to the pelage along the dorsal midline over the stomach. Both instruments are built by Wildlife Computers, Redmond WA, USA. The HTR will be in addition to a TDR (13cmx8cmx3cm) and a Satellite spot tag (8cmx3cmx 3cm). The HTR will be potted in a flotation package from Ecotech, Nanaimo BC, Canada and glued to the pelage using an adhesive (5-minute epoxy or cyanoacrylate). The flotation package is mounted on a base plate that is glued to the pelage and remains on the animal until it is molted. The footprint of the base plate is about 8 cm X 13 cm and 0.7 cm thick and weighs about 100 gms. The floating package adds another 2-3 cm in height to this footprint, and weighs an additional 270 gms (70 for the HTR, 120 for the syntactic foam, 70 for the VHF transmitter, and 10 for the zinc link). The floating part is attached to the base plate by a zinc link, which corrodes in 7-14 days. The HRT package contains flotation and has a VHF transmitter, therefore it can be located, recovered, and the data downloaded without recapturing the seal.

The STT is essentially a telemetry "pill" (56 mm long x 20 mm in diameter), placed in the stomach of the seal. To lengthen the amount of time the STT remains in the stomach of the animal, we will place each STT pill into a piece of non-toxic, biodegradable ethafoam (15x12x2 cm). This ethafoam layer increases the size of the SST to increase retention time without endangering the health of the animal. Prior to intubation, the ethafoam around the STT pill will be compressed with biodegradable paper tape to decrease the cross sectional area. The ethafoam covered STT pill will be compressed to a harbor seal sized bolus i.e., ~3.5 x 3.5 x10cm.

The STT pill will typically be digested and passed within 7-10 days. The STT pill will be lubricated with KY jelly and inserted into the stomach of an isoflurane-anesthetized seal via a stomach tube. Intubation will be with commercially available cuffed endotracheal tubes. Intubation will be facilitated by opening the mouth with short loops of cord and laryngoscopic visualization using a 19 cm straight blade.

Captured seals (> 30kg) will be restrained and inhalable isoflurane will be administered only for the amount of time necessary to insert the STT (generally less than 20 minutes including recovery time from the anesthesia).

Gassed seals will be held until the animal has regained full response and is able to reenter the water on its own. If deemed necessary due to low ambient temperatures, an insulated mat will be placed under the seal to reduce

heat loss to the substrate. Isoflurane reduces stress on animals and decreases the amount of time the animal is held. We will use equipment and techniques developed and described in detail by Heath et al. (1996, 1997). This technique has been used extensively on captive, rehabilitated and wild-caught pinnipeds, including harbor seals, Steller sea lions and California sea lions. It has been used for surgical procedures that require a pinniped to be anesthetized (e.g., gastric lavage, endoscopy, radiographs, implantation of telemetry devices, and biopsy) as well as for branding and ultrasound. Gas anesthesia will be administered and monitored only by personnel thoroughly trained in its application and overseen by a veterinarian, veterinary technician or personnel thoroughly trained in its application.

This technique was used successfully on 32 grey seals from Sable Island, Nova Scotia with 29 recorders recovered (4 animals did not return, but the HTR from one of those animals was recovered) (Austin et al. 2006a). The STTs were retained for 2-40 days (mean 16.3 SD 2.67 days/seal) in the stomach and no significant differences were found in dive variables, mass gain, or body mass at arrival to the breeding colony between seals carrying only TDR packages with those carrying both TDR and STT packages. Austin et al. (2006a) concluded that STTs overall had no negative effect on the foraging behavior of their study animals.

Hypothesis 2 b: The foraging distribution and contaminant signatures of harbor seals do not differ regionally or temporally.

Harbor seals are especially good sentinels for studying the relationships between diseases, environment, and population dynamics of marine mammals because they are year-round residents of coastal ecosystems that are regularly affected by natural disturbances (e.g. toxin outbreaks) and have substantial levels of anthropogenic contaminants. As top predators in this system, harbor seals are exposed to diseases, natural toxins, and contaminants from lower trophic levels through the food chain. In addition, harbor seal health and population trends have been studied as part of numerous ongoing research projects beginning in 1963 (Arnold 1968; Newby 1971; Johnson and Jeffries 1983). This research continues with ongoing contaminant sampling, disease screening and population assessments, so an historical context exists to evaluate the findings of the proposed studies. Harbor seals are apex predators and have been used as sentinel species of the ecosystems in which they live. They spend most of their time traveling or foraging in coastal waters of Oregon, Washington and British Columbia. Thus they feed in areas of coastal agricultural runoff and city utility outfalls (e.g. sewage) or on prey that frequent these habitats. The objective of this study is to associate contaminant levels and pathogens to foraging areas of harbor seals in Washington. The foraging distribution data will be combined with land-use and agricultural and city utility outfalls and runoffs to identify relationships between all the variables. We expect that animals foraging close to human population centers will have higher contaminant levels compared to animals foraging near areas of low or no human populations. Our collaborative studies on harbor seals have helped to highlight a significant regional PCB contamination within Puget Sound and dioxin and furan contamination by pulp mills in British Columbia (Ross et al. 2004). These contaminants as well as fire retardants (PBDEs) are elevated in harbor seals and their prey (Ross et al. 2004, Cullon et al. 2005). Several studies have demonstrated that exposure to moderate levels of persistent organic pollutants adversely affects the immune and endocrine systems of harbor seals (Ross et al. 1996, Simms 2000). They forage high on the food chain, are a relatively long-lived species, and consequently have been used as sentinels of marine ecosystem health. Since they consume a variety of fish species, they serve to integrate contaminant signals from the food chain. They do not migrate, so they provide a more 'local' signal of contamination than would, for example, resident killer whales that have seasonal movements and can swim hundreds of miles in a day. There are currently ongoing studies of harbor seals in both Washington State and British Columbia, with this species rapidly becoming an important 'canary in the coal mine' for understanding contaminants in this area.

WDFW Puget Sound Ambient Monitoring Program (PSAMP) has identified harbor seals as the primary species to monitor the overall health of the Puget Sound ecosystem (Nysewander and Stein 1992). These studies are proposed as part of a long-term study being conducted by WDFW to monitor the marine ecosystem to determine contaminant levels and their effects on Washington harbor seal populations for PSAMP and this research is mandated by the Washington State legislature.

Results will be relevant to temporal contaminant studies carried out in Puget Sound harbor seals in the past, and will be useful to wildlife and conservation managers concerned with the health of marine mammals and other high trophic level wildlife, managers concerned with the state of contamination of estuarine and coastal environments in areas along the Pacific coast, and managers concerned with human health, since certain consumer groups (e.g. native groups, fishers) share the marine food chain with marine mammals.

Blood sampling. Blood samples will be taken for stable isotope analysis (hypothesis 2a), blood chemistry, immunology, genetic profiles and contaminant work (hormones (thyroid: T3 and T4) and vitamins (e.g. Vitamin A) hypothesis 2b). Blood samples from harbor seals will be collected from the extradural intravertebral sinus as described by Geraci and Smith (1975) and Dierauf and Gulland (2001).

Blubber, muscle and skin biopsy. Stable isotope work was previously performed on dermal tissue from biopsies in Washington and British Columbia harbor seals and ratios are reported in Cullon et al. (2003). Stable isotopes are shown to identify trophic level differences and marine versus terrestrial influence (near-shore or offshore) (Satterfield and Finney 2002). We propose to expand our health assessment toolset to include genomic based health assessment endpoints. The novel use of genomics to assess body condition and contaminant effects could prove to be a powerful tool in fisheries management by providing insight into the general health of top predator marine mammals. Genomic tools can generate an enormous wealth of information on the overall health of the individual by providing quantitative measurements of the expression of genes of interest such as hormone receptors and nutritional status (e.g. lipid deposition, lipid metabolism). As harbor seals are top level predators, they may respond to applied pressure from the base of the food web. In addition, overall health of top predators may be impinged i) solely on contaminant exposure, ii) on nutritional stress alone, or iii) on a combination of numerous stressors, including both contaminant and nutritional stress. A genomic based health assessment approach allows for an assessment of overall health of the organism inclusive of both contaminant and nutritional stressors and may provide an indication of overall marine ecosystem quality.

We propose to build on the toxicological expertise generated through past collaborations and assess health related effects in marine mammals by a) developing, in collaboration with Dr. Caren Helbing at the University of Victoria, approximately 15 harbor seal specific gene target primers (contaminant and nutritional endpoints), b) assessing the gene expression of these gene targets in harbor seal skin and blubber biopsies collected previously from free ranging harbor seals along the Strait of Georgia and Puget Sound, and c) comparing gene expression results to contaminant burdens and other physiological endpoints (hormone levels, vitamin levels, and other indicators of body condition (e.g. lipid content)) as well as data generated for previously studied prey species. We will also compare the resilience of gene expression from individuals in more productive, less contaminated areas of the Strait of Georgia with those inhabiting less productive, more contaminated areas, which have more noise and disturbance. Individuals under stress are expected to show differential gene expression compared to those inhabiting areas of less stress. We will be collaborating with Peter Ross's laboratory, who has been successful in demonstrating increased thyroid receptor a and b gene expression and increased retinoid receptor a gene

expression in harbor seals with high PCB burdens compared to those with lower PCB burden (Tabuchi et al 2006; Mos et al 2006). Recently, in collaboration with The University of Victoria, the Ross laboratory has developed a suite of killer whale (*Orca orcinus*) specific gene targets to assess gene expression of several receptors that are known to be induced by various contaminants. We propose to expand this toolbox to include harbor seals, which are ideally poised to serve as a high trophic level 'sentinel' of ecosystem health. Genomic indicators are projected to be useful in identifying areas of concern where marine mammals may be exposed to a number of stressors and may be used to help elucidate biological pathways involved in marine mammal survival and diminishing body condition. In addition, these tools will help to establish a baseline of ecosystem health in the wake of global warming and changing Pacific Ocean.

From the 750 harbor seals captured, up to 360 (180 pups, 180 non-pups) may have blubber samples taken for contaminant analysis. Quality Assurance/Quality Control established by the U.S. Environmental Protection Agency for contaminant sampling in harbor seal tissues for the Puget Sound Estuary Program recommends a sample size of at least 10 non-pups and 10 pups per area per year (PTI 1991, PSEP 1989a, 1989b, 1991a, 1991b). Laboratory analyses will be conducted in cooperation with Peter Ross (DFO, Sydney, British Columbia, Canada, V8L 4B2).

Whisker and hair collection. Temporal variations of mercury contamination can be detected along one human hair axis reflecting differences in diet (Dolbec et al. 2001). Contrary to humans, seals molt every year and their hair grows rapidly over a short period of time. Seal hair samples will thus contain less variation than samples taken from mammals that have continuous hair growth (Greaves et al. 2004). However, whiskers, even though they are shed every year in harbor seals, grow throughout the year (Hirons et al. 2001) and stable isotope variations along the whisker axis have been found (Zhao et al. 2004). This project is the first attempt to detect mercury in harbor seal whiskers and we hope to be able to detect temporal trend in mercury contamination along the whisker axis. In order to capture the more recent feeding activity and thus the more recent mercury intake we propose to pluck one mid-length whisker from each cheek. Fur from the shaved biopsy site (described below) will also be collected and used for stable isotope (trophic level indicator) and mercury concentration. Whisker and hair samples will be collected from up to 360 animals per year (180 pups, 180 non-pups). Whiskers and hair will be collected from all animals sampled for blubber.

We do not anticipate that the activities associated with this study will cause harmful or long-term stress, discomfort, pain, or injury to any of the species handled. Animals likely experience stress and discomfort while being captured and handled but the effects are only temporary.

Project 3: The ecology of contaminants, environmental toxins and infectious pathogens in harbor seals

Hypothesis 3. Prevalence of pathogens and epizootics in harbor seals have not increased temporally or spatially

Determination of the health status of Washington state harbor seals has focused on serologic screening for a variety of diseases that have been linked with mass die offs and illnesses around the world. Some of these have the potential to cause reproductive failure in seals and other marine mammals. Serological screening aids in the detection of diseases of concern and possible new emerging pathogens that may result in epizootics. Collection of dead harbor seals found at haulout sites aids in determining survival information and confirms what pathogens are present in the population and whether they may be causing mortality or reproductive failure.

This study has two aspects: 1) during capture operations, serum and other samples (swabs, urine and feces) will be taken from live animals to test for presence of pathogens by serology, culture and isolation and 2) dead harbor seals will be collected at South Puget Sound haulout sites at least weekly during the observation and resight window of 15 June - 1 October and opportunistically elsewhere during capture and scat collection throughout the year. Depending on carcass condition (time since death and presence of scavenging), necropsies will be performed to determine cause of death and to collect samples for histopathology as possible.

Blood samples from captured harbor seals will be collected from the extradural intravertebral sinus as described by Geraci and Smith (1975) and Dierauf and Gulland (2001). Collection of dead harbor seal pups provides the opportunity to compare annual survival rates from birth to weaning and allows us to collect information on causes of mortality among newborn and nursing pups at Gertrude Island where our life history study is concentrated and compare it to with newborn and nursing pups found dead in other areas and those in rehabilitation facilities. WDFW collects and necropsies stranded marine mammals throughout Washington State. Collecting fresh dead harbor seals from haulout sites allows us to make comparisons of survivorship and causes of mortality for all age classes and species. Monitoring of population status and health are mandated under the MMPA, and are the management responsibility of the respective resource agencies involved.

Project 4: Harbor seal life history parameters

Hypothesis 4: Harbor seal age structure, survival, and reproductive rates are unchanged since reaching OSP.

Up to 394 harbor seals will be branded annually using a hot, rolled steel branding iron. All age classes will be branded including weaned pups, however, weaned pups < 20 kg will not be branded, nor will near-term females.

This is the first branding study of west coast harbor seals used to determine life history parameters. Other studies of west coast harbor seal life history parameters are based on collections of specimens in Canada and southeast Alaska (Bigg 1969, Pitcher and Calkins 1979). These populations were decreasing (Alaska) and increasing (Canada). The annual rate of increase in the number of harbor seals in Washington has declined significantly since surveys began in the 1970s, indicating that the population is now reaching stability (Jeffries et al. 2003).

Project 5: Population substructure in harbor seals in Washington and Oregon

Hypothesis 5: There are genetic differences among coastal and inland harbor seals in Washington and Oregon

Genetic skin samples will be collected from unweaned pups at all haulouts in Washington and Oregon to determine the validity of the present stock boundaries for management purposes using mitochondrial and nuclear DNA. Samples used for genetics are collected in the process of tagging: the skin from the 6 mm hole punched for tag placement will be preserved in a 20% saline solution of DMSO (Amos and Hoelzel 1991), stored at room temperature until the DNA is extracted, and later stored in a -80 oC freezer. Up to 150 samples will be collected annually from haulouts in Washington and Oregon. Mitochondrial DNA will be assessed by sequencing and nuclear DNA will be assessed by determining relative frequency of 8 microsatellite loci. Similar work has been done with MtDNA with Alaskan harbor seals (Westlake and O'Correy-Crowe 2002). The results in Washington and Oregon will be compared with published work in Alaska.

California sea lions.

Project 6: Abundance, distribution and health of California sea lions in Washington and Oregon

Hypothesis 6. California sea lion distribution, abundance, and health in the Pacific Northwest is stable.

A Generalized Logistic growth model of pup counts obtained during 1975-2005 (excluding El Niño years) indicated that the U.S. stock of California sea lions reached its Maximum Net Productivity Level of 39,800 pups in 1997 and has reached carrying capacity at 46,800 pups per year (Carretta et al. 2007). In order to assess this recent OSP determination we will conduct 1 to 4 surveys per month surveys to document the distribution and abundance of California sea lions throughout their nonbreeding range in Washington and Oregon and adjacent waters. Incidental disturbance, though unlikely, is possible during survey work. Monitoring of population status and health are mandated under the MMPA, and are the management responsibility of the respective resource agencies involved. Health screenings will be conducted via blood sampling of captured animals. Blood samples for disease screening will be taken from 50 California sea lions during capture operations described below.

Project 7: California sea lion food habits and predation of threatened, endangered, and/or depleted fish stocks in Washington and Oregon

Hypothesis 7 a California sea lions in the Pacific Northwest are significant predators of threatened, endangered, and/or depleted fish stocks.

As the California sea lion population has recovered, concentrations of wintering males have been involved in a growing number of resource conflicts involving predation on threatened, endangered, or otherwise depleted fish stocks (Jeffries and Scordino 1997, NMFS 1997, Fraker and Mate 1999, NMFS 2008). The study of foraging behavior in general, and Section 120 of the MMPA specifically, requires the ability to unequivocally identify individual animals and branding is the only permanent marking technique available that allows long term and long distance identification. The target sample sizes requested are based on our past experience, staffing, and cost. It should be noted, however, that the realized sample size for a particular year is largely out of researcher control since animals must "voluntarily" enter a trap before they can be captured. Tagging with flipper tags, patches, and external telemetry instruments, in addition to collecting scat samples, all serve to increase our ability to document sea lion foraging activity and determine whether they are significant predators on threatened, endangered, and/or depleted fish stocks.

Instruments – Satellite, Time depth recorders, VHF radio tags, acoustic tags. We will instrument subadult and adult California sea lions to describe their foraging behavior. The instruments will be satellite tags, time depth recorders (TDR), VHF radio tags, or acoustic tags deployed alone or in combination (no more than 3 instruments on an animal). Each of these tags offers a different view of how the animals use their habitat and the characteristics of the habitat. We plan to instrument up to 100 California sea lions per year; individuals may be recaptured and handled for TDR or satellite tag removal.

VHF radio transmitters will be attached to temple cattle ear tags (51 x 16 x 26 cm; total weight up to 35 grams) and applied to the hind flippers or attached directly to pelage using adhesives (Devcon 5-minute epoxy or Loctite Super Bonder 422 or similar adhesive). TDR units will be comparable to models manufactured by Wildlife Computers, Redmond, WA. They are 2.9 cm in diameter and 15.4 cm long, and do not exceed 196 grams in weight. TDRs will be applied to the pelage using adhesive.

Satellite-linked transmitters will be comparable to models manufactured by Wildlife Computers, Redmond, WA. The transmitter used for California sea lions will be 0.5 watts (9 x 14 x 3 cm; up to 450 g.). Acoustic tags (e.g., V16: 9 g, 16 by 55 mm, 69 kHz, 152 dB re 1 IPa at 1 m; Vemco, Nova Scotia, Canada) will be attached directly to pelage using adhesives (Devcon 5-minute epoxy or Loctite Super Bonder 422 or similar adhesive). These application techniques have been used successfully on a variety of pinnipeds, including harbor seals, California sea lions and northern elephant seals (Stewart et al. 1989, DeLong and Stewart 1991, Wright et al. 2007). Attachment of instruments to the pelage with adhesives was developed by the principal researchers and allows for the loss of instrument packs during the annual molt.

Hypothesis 7 b. California sea lions may be displaced from certain foraging locations by killer whale vocalizations.

California sea lions prey on endangered and threatened salmonids and other fish species throughout the Pacific Northwest but few non-lethal deterrence techniques have been developed which demonstrate any long term effects. Acoustic harassment or deterrent devices (AHD's) have been used with some success to displace sea lions from the Ballard Locks but these devices are costly and emit high decibel sounds which could displace other marine wildlife. Killer whale vocalizations have not been tested in the Pacific Northwest as a deterrence method to displace sea lions. Recent experimental playbacks of killer whale vocalizations in British Columbia showed an effect on harbor seal behavior between the dialects of resident versus transient killer whales (Deecke et al. 2002). We propose to experimentally test killer whale vocalizations at various locations in the Pacific Northwest to determine if they may displace California sea lions from foraging locations.

Project 8: The abundance, distribution and health of northern elephant seals

Hypothesis 8: The abundance, distribution and health of the northern elephant seal in Washington and Oregon is stable.

Northern elephant seals will be surveyed opportunistically during the course of other aerial, ground and boat surveys to document their occurrence in Washington and Oregon. Annually, up to 50 northern elephant seals will be restrained physically, tagged with Jumbo roto tags in both hind flippers, marked with bleach, measured, sexed and have blood drawn for disease screening. Tagging and bleaching will serve to identify individuals to determine the stability of northern elephant seals found in Washington and Oregon.

(b) N/A

Description: C. Methods

1. Duration of the Project and Locations of Taking:

a. duration The research will be conducted for 5 years, from 1 Oct 2008 to 30 Sept 2013. Taking may be conducted at all times of the year in Washington, Oregon and adjacent waters.

b. location Harbor seals are non-migratory residents and use over 380 haulout sites in Washington and Oregon. California sea lions are found north of central California on a seasonal basis, as males disperse northward following the breeding season (Mate 1975, Bigg 1985, NMFS and WDFW 1995, Huber 1991). California sea lions are found throughout Washington and Oregon waters, with an estimated 8,000 to 10,000 individuals

migrating into the area (Bigg 1985, Brown 1988, NMFS and WDFW 1995, NMFS 1996, ODFW, WDFW and NMML survey data). In Washington and Oregon, this species uses at least 19 haulout sites. Northern elephant seals are found in Washington and Oregon in all months of the year. Locations of harbor seal, California sea lion, and elephant seal aerial, land and boat survey sites including habitat type for Washington are listed in Jeffries et al. (2000) and for Oregon in Appendix I.

A number of the San Juan Islands are designated as USFWS National Wildlife Refuges. Proposed activities are consistent with protective status of the sites including no island access during the critical seabird nesting season 15 April – 30 July. No alternative locations are possible as these are large harbor seal haul out locations. When activities need to take place in areas where other researchers are currently working, the activities will be coordinated with the other researchers.

On the outer Olympic Peninsula coast of Washington, a number of harbor seal haulout sites are within the USFWS Washington Islands Wildlife Refuge and marine waters designated as the Olympic Coast National Marine Sanctuary. Likewise, on the Oregon coast, a number of harbor seal haulout sites are within the USFWS Oregon Islands Wildlife Refuge. No alternative locations are possible as these are large harbor seal haul out locations. California sea lions are captured in Washington State at Shilshole Bay or Everett, and in Oregon at the East Mooring Basin in Astoria. Surveys, tracking, and scat collection will occur at haul-outs throughout OR and WA (see Jeffries et al. 2000 for WA haulouts; Appendix I for OR haul-outs). Testing of killer whale vocalizations on the behavior of sea lions will occur at Shilshole Bay, Everett, Ballard Locks, Neah Bay and East Bodelteh Island in Washington, and at Bonneville Dam, Astoria, Rogue River, and the lower Columbia River near Astoria in Oregon. Research areas along the Oregon and Washington coast and Washington inland waters include nearshore federal refuge rocks and islands accessed under U.S. Fish & Wildlife Service Special Use Permits. Possible interactions with species other than target marine mammal species are addressed in these permits and are considered to be negligible by USFWS. Other work areas can include state lands where potential interactions with other species are evaluated through internal research planning processes. Research conducted on or near any of these sites is carried out using methods of access that have been developed over more than 30 years of successful field research activities designed to minimize disturbance to any wildlife species using the area.

2. Types of Activities, Methods, and Numbers of Animals or specimens to be taken or imported/exported

a. Take table 1 (attached)

b. narrative account

Incidental harassment during aerial, boat and ground surveys,

Up to 30,000 harbor seals, up to 8,000 California sea lions, and up to 100 northern elephant seals may be taken up to 30 times annually by incidental harassment at haulout and rookery sites in Washington and Oregon as described during aerial, boat and ground surveys for assessment and brand reading. Up to 250 Steller sea lions may be taken up to 20 times by incidental harassment during aerial and boat surveys. Up to 100 killer whales may be taken up to 2 times by incidental harassment during playback experiments of killer whale vocalizations to California sea lions.

Surveys. Aerial surveys will be flown at a minimum of 500 feet altitude (typically 600-800 feet) and at a speed of 80 to 100 knots in a fixed-wing, single engine aircraft. Vessel surveys in Washington and Oregon waters will be conducted from small power boats (15 to 26 ft) for brand reading and assessment. Boats will approach close enough to read tags and marks of harbor seals and California sea lions. Haulout sites are approached slowly from a distance of 100-150 m and circled several times to conduct counts. Generally little disturbance is observed from these distances. After the seals or sea lions have become accustomed to the vessel, closer approaches are made to within 30-50 m to read tags or brands and take photographs. This minimizes disturbance and typically does not result in any behavioral response from seals or sea lions. Ground surveys will be conducted from cover of blinds, docks, rocks or sand dunes for brand reading or assessment surveys of harbor seals. Land based surveys are accessed either by vehicle or on foot. Each site is approached using natural or human made cover to screen the observer. Camouflage and blinds conceal our approach to observation sites. Observers have extensive experience in conducting aerial, boat, and ground surveys of these species, and we anticipate that harassment of very few individuals will actually occur during most assessment surveys. During the course of research activities, every effort will be made to avoid incidental disturbance.

Between 1984 and 2007 harassment occurred on only 20% of all aerial surveys and caused less than 5% of the pinnipeds on shore to go into the water (data from WDFW and ODFW survey logs). On aerial surveys efforts to reduce disturbance include slow flight, low power settings, and other noise reduction techniques. Vessel disturbance will be kept to a minimum by slow approach and reducing engine noise.

Incidental harassment during capture, scat collection, or dead pup surveys

Up to 20,000 harbor seals, 8,000, California sea lions, and 100 northern elephant seals may be incidentally harassed up to 30 times annually during capture, scat collections, or dead pup surveys.

Scat collection. Scats are collected throughout the year to describe the diet of harbor seals. Scat collection is usually combined with captures of animals to avoid additional disturbance. After disturbance caused by captures, researchers move through haul out sites and collect scats. The scats are frozen and later processed to recover hard parts of prey for identification.

Dead pup surveys. Dead harbor seals will be collected at South Puget Sound haulout sites at least weekly during the observation and resight window of 15 June to 1 October and opportunistically elsewhere during capture and scat collections throughout the year. Typically surveys are conducted during high tide when the lowest number of seals is present or after a natural disturbance (bald eagles, great blue herons, coyotes, boats or marine debris. If there is no natural disturbance, the survey is rescheduled to later in the week. If the survey occurs during the pupping season, observations will be made for at least 15 minutes prior to disturbing animals to confirm there is no active pupping activity. If pupping activity is occurring, no collections will be made on that day. This portion of the study does not expose animals to harmful levels of stress or discomfort, pain or injury.

Harbor seals

Up to 750 harbor seals of either sex may be taken annually by the activities listed in Table 1. The total number of harbor seals taken over the 5 year duration of the permit will not exceed 3750 harbor seals as indicated in Table 1. Females close to parturition or with newborn pups (less than 1 day as determined by condition of pups umbilical cord) will not be handled but will be released immediately. Some animals will be taken more than once or for more than one procedure as indicated in Table 1. Multiple takes will generally be for deploying different instruments or repeat tissue sampling to determine changes in health over time. Animals will not be

recaptured more than twice in a single year but may be captured again in subsequent years for a different project or as a serial sample for the same project. This is because some animals are more accessible than others because of their distribution on the rookery. Using an individual for several procedures reduces the total number of animals that are needed to achieve the research objectives.

Capture, restraint, morphometrics and tagging. Up to 750 harbor seals will be captured annually. Capture operations will use methods previously developed to successfully capture and handle pup, juvenile and adult harbor seals in California, Oregon, Washington, and British Columbia (Beach et al. 1985, Allen 1988, Harvey 1987, Stein 1989, Huber 1995, Jeffries et al. 1993). The primary method of capture will be by beach seine deployed from boats. Harbor seals resting on shore are approached by two outboard powered boats, the lead boat carrying the capture net. The capture net is 120 to 170 m long and 8 m in depth; the netting is 20- 30 cm stretch mesh #36 nylon, dyed green. Paired floats are spaced every 1 m on the floatline, the leadline has 454 g of lead every 2 m. The lead boat approaches resting seals slowly, eventually reaching 20 k as seals head into water. A 0.5 diameter float attached to one end of the capture net is thrown toward shore and picked up by the second boat as the first boat arcs in front of the haulout and beaches on the opposite side of the haulout site. Both ends of the capture net are on shore within 2 minutes of deployment. Seals are entangled as the net is brought to shore. Once all seals are on shore, they are removed from the capture net and placed in individual hoop nets. Additional animals may also be captured by flinging hoop nets over them while on the beach. Details of these methods have been described in Jeffries et al. (1993). Once captured, each seal will be held in an individual hoop net for no longer than 3 hours while awaiting handling. Handling time is generally about 20 minutes; the animal is released immediately after processing. Animals will be physically restrained while being processed. If chemical restraint is necessary, animals will be given an intramuscular injection of valium (0.2 – 0.3 mg/ kg). Use of valium occurs in < 10 % of captures.

Over 2900 harbor seals have been handled successfully using these methods by the PI and CIs of this permit. Every effort is made to ensure the safety of the animals, however mortalities occasionally occur (24 mortalities out of over 2900 animals handled). Most mortalities are precipitated by poor health of the animal which cannot be assessed prior to capture. Full necropsies are completed to determine the cause of death. There is no evidence of post-handling mortality from the capture procedures outlined in this permit application (based on instrumentation records and survival rates).

Actions to be taken if an animal reacts negatively to capture or restraint include an injection of Doxapram (5 mg/kg intravenously or intratracheal) to stimulate respiration and epinephrine will be administered to stimulate circulation and/or intubation with an endotracheal tube connected to an ambu bag or oxygen source.

All animals will be weighed, measured, and sexed after capture. These data are necessary in determining life history and annual changes in general health. All animals that are handled will be tagged with Dalton Jumbo roto tags in the inter-digital webbing of the rear flippers. These tags are considered the best long-term tag for phocids (Testa and Rothery 1992).

Branding. Up to 394 harbor seals will be branded with hot brands, no anesthesia. Hot brands will be applied with heated numbered or lettered irons constructed of 3/8 inch solid, rolled steel which are heated with a propane-fired forge. Brand size is 4 inches for California sea lions and 3 inches for harbor seals. Exposure times are approximately 3-4 seconds with a red hot iron. Brands are applied with less than 5 lbs of pressure. Brands will not be applied to harbor seal pups that weigh less than 20 kg nor to near term females. Branded animals will be physically restrained rather than anesthetized because, although we consider the risk associated with properly applied anesthesia to be low, physical restraint requires no recovery time and therefore allows the animal to return to the water sooner than would be possible if anesthetized. Brands on harbor seals and California sea lions are fully healed in less than 3 months. Hot branding has also been used successfully to mark Steller sea lions in Alaska and Oregon (R. Brown pers. comm., Calkins and Pitcher 1982). Branding techniques will be those which have been successfully developed by ADFG, NMFS and ODFW personnel and have been shown to not impair growth or increase mortality in harbor seals, Steller sea lions, California sea lions or northern elephant seals (NMML and OPR 1993, Merrick et al. 1996). Principal researchers have extensive experience in branding pinnipeds.

Dye, Pelage, or Patch Marking. Any animals that are handled may be dye marked using hair dye (Lady Clairol), shaved, or have a neoprene patch superglued to their pelage as a temporary mark to facilitate resighting after release.

Blood sampling. Any animal handled may have blood collected. Not more than 1.0 ml blood per kg body mass per capture event will be taken and amount will not exceed 45 ml of blood. Needle insertions will not exceed 3 attempts per site per capture event taken from spinal sinus using the vacutainer system. This is a standard method for sampling blood from harbor seals (Dierauf and Gulland 2001). If whole blood is collected for hematology, it will be kept cool and submitted to Phoenix Laboratory. Whole clotted blood will be kept on ice after collection; centrifuged in the lab and serum will be extracted and then frozen immediately pending shipment to appropriate laboratories. At least 2 ml of serum aliquot will be stored at WDFW for archival purposes. Serum may be submitted for analysis of serum chemistry, disease screening, immunology and hormone studies (circulatory thyroid and Vitamin A) levels to laboratories including: Phoenix Laboratory, Animal Health Center, Department of Fisheries and Oceans, University of California, Davis, Washington Department of Agriculture, Washington Animal Diagnostics Laboratory, National Veterinary Service Laboratory, National Institute of Health, and Oklahoma State Animal Diagnostic Laboratory.

Nasal, rectal, conjunctival and urogenital sampling. Any seal that is handled may have up to 6 sterile swabs used to take two samples of each area for virology and bacteriology. Two samples will be placed in tubes with appropriate bacterial culture media and 2-4 samples will be placed in tubes with viral media.

Milk sampling. Up to 20 ml of milk will be expressed from the mammary system of parturient females. Animals will be restrained and injected with oxytocin (intramuscular administration; 20-40 USP units). Milk will be analyzed for contaminants and pathogens from no more than 15 adult females per year.

Blubber, muscle, and skin biopsy. Blubber, muscle, and skin biopsy will be accomplished using a sterile 3.5-8.0 mm biopsy punch. All three tissues will be collected at once when required, but in some cases only blubber and skin will be collected. Blubber core samples will be collected from the pelvic region. The biopsy punches are 3.5-8 mm in diameter. A total core of 24 mm of

blubber is necessary to answer the research questions outlined in this application for integrating contaminant, genomic and fatty acid information. Up to 4 biopsy punches may be required (i.e., 4 biopsies x 6 mm depth of blubber = 24 mm core of blubber). Typically, each biopsy

punch provides skin and blubber down to the muscle fascia. If four samples are taken, three samples are used for contaminant and genomic research and one sample for fatty acid research.

The biopsy site will be prepared by shaving the hair with a razor, scrubbing with Betadine and rinsing with alcohol. A complete cross section biopsy of blubber from skin to muscle will be taken. Wounds resulting from the

biopsy punch will be left open to allow drainage. Fatty acid samples will be immediately placed in chloroform containing 0.01% BHT (Butylated hydroxytoluene) as an antioxidant and stored in glass tubes with Teflon lids. Contaminant and stable isotope samples will be placed in sterile aluminum foil or glass jars. Skin will be stored in 100% ethanol or DMSO for genetic analyses. Blubber biopsies will not exceed 4 per animal. The number of animals with blubber samples taken will not exceed 360 samples (180 pups, 180 non-pups) per year. Blubber and muscle will be frozen until analysis. When blubber and muscle samples are not required, skin samples will be taken from the interdigital webbing on the rear flippers using a small scalpel or biopsy punch. Whenever animals are tagged, the tissue removed for the placement of the tag will be retained as a skin sample rather than taking an additional sample with a biopsy punch.

Whisker and hair collection. Animals will be physically restrained and one mid-length whisker will be plucked from each cheek using forceps for mercury concentrations research. Hair (1 g) will be collected from shaved biopsy site using a razor to be used for stable isotope and mercury concentration. Whisker and hair will be collected from 360 animals per year (180 pups and 180 nonpups). Whiskers and hair will be collected from all animals sampled for blubber.

Instruments – Satellite, Time depth recorders, VHF radio tag, acoustic tags Pups, juveniles or adults may be instrumented with one or more of the following: VHF radio tags, satellite tags, time-depth recorders (TDRs) or acoustic tags. The technology in this field is changing quickly and it is impossible to know the size and weight of instruments that will be deployed over the duration of the permit. Satellite-linked transmitters will be comparable to models manufactured by Wildlife Computers, Redmond, WA. VHF radio transmitters will be attached to temple cattle ear tags (51 x 16 x 26 cm; total weight up to 35 grams) and applied to the hind flippers. The transmitter used for harbor seals will be 0.25 watts (11 x 4.5 x 2.3 cm; up to 170 g). TDR units will be comparable to models manufactured by Wildlife Computers, Redmond, WA. They are 2.9 cm in diameter and 15.4 cm long, and do not exceed 196 grams in weight. TDRs will be applied to the pelage using Devcon 5-minute epoxy or similar adhesive. Acoustic tags (e.g., V16: 9 g, 16 by 55 mm, 69 kHz, 152 dB re 1 lPa at 1 m; Vemco, Nova Scotia, Canada) will be attached directly to pelage using adhesives (Devcon 5-minute epoxy or Loctite Super Bonder 422 or similar adhesive). These application techniques have been used successfully on a variety of pinnipeds, including harbor seals, California sea lions and northern elephant seals (Stewart et al. 1989, DeLong and Stewart 1991). The dimensions and weights of these tags are subject to change. Instrument weight and combinations of instruments will not exceed 1% of the body weight of any animal. Up to 60 TDR, satellite, acoustic or VHF tags will be deployed in a year. No more than 3 instruments will be deployed on an individual. In addition, VHF or acoustic tags may be deployed on up to 150 harbor seals of all ages. Instruments (satellite and TDR) will be glued to the pelage with Devcon 5-minute epoxy, Loctite Super Bonder 422 or similar adhesive. Instruments will generally be placed between the shoulders, but the tags may also be placed on the head or on the back. Instruments will remain attached for up to 9 months and will either be lost when the animal completes its annual molt, or released via a corrodible link. Data from satellite tags will be accessed remotely through System Argos. Data from time-depth recorders will be downloaded to computers when recovered. Foraging ecology research of harbor seals conducted by PI and CIs of this permit has noted no negative impacts to animals that have been outfitted with instruments nor have we noted any effects on survival of instrumented animals (Huber et al. 2001, London et al. 2006, Austen et al. 2006a, Wright et al. 2007).

Instruments – Stomach temperature transmitter and stomach temperature recorders. The stomach temperature telemetry system consists of two separate parts: a stomach temperature transmitter (STT, 32 g) placed in the stomach of the seal, and a radio receiver with an integrated microprocessor data logger (HTR) that will be glued to the pelage along the dorsal midline over the stomach. Both the transmitter and recorder are built by Wildlife Computers, Redmond WA, USA. The HTR will be in addition to a TDR (13cmx8cmx3cm) and a Satellite spot tag (8cm x 3 cm x 3cm). The HTR will be potted in a flotation package from Ecotech, Nanaimo BC, Canada and glued to the pelage using an adhesive (5-minute epoxy or cyanoacrylate). The flotation package is mounted on a base plate that is glued to the pelage and remains on the animal until it is molted. The footprint of the base plate is about 8 cm X 13 cm and 0.7 cm thick and weighs about 100 g. The floating package adds another 2-3 cm in height to this footprint, and weighs an additional 270 g (70 for the HTR, 120 for the syntactic foam, 70 for the VHF transmitter, and 10 for the zinc link). The floating part is attached to the base plate by a zinc link, which corrodes in 7-14 days. The HRT package contains flotation and has a VHF transmitter, therefore it can be located, recovered, and the data downloaded without recapturing the seal.

The STT is essentially a telemetry "pill" (56 mm long x 20 mm in diameter), placed in the stomach of the seal. To lengthen the amount of time the STT remains in the stomach of the animal, we will place each STT pill into a piece of non-toxic, biodegradable ethafoam (15x12x2 cm). This ethafoam layer increases the size of the SST to increase retention time without endangering the health of the animal. Prior to intubation, the ethafoam around the STT pill will be compressed with biodegradable paper tape to decrease the cross sectional area. The ethafoam covered STT pill will be compressed to a harbor seal sized bolus i.e., ~3.5 x 3.5 x10cm.

The STT pill will typically be digested and passed within 7-10 days. The STT pill will be lubricated with KY jelly and inserted into the stomach of an isoflurane-anesthetized seal via a stomach tube. Intubation will be with commercially available cuffed endotracheal tubes. Intubation will be facilitated by opening the mouth with short loops of cord and laryngoscopic visualization using a 19 cm straight blade.

Captured seals (> 30kg) will be restrained and given valium and atropine intramuscularly prior to gas anesthesia. Valium dosage will be 0.2--0.3 mg/kg and atropine will be 0.02mg/kg (Dierauf and Gulland 2001). Inhalable isoflurane will be administered only for the amount of time necessary to insert the STT (generally less than 20 minutes including recovery time from the anesthesia). We will use equipment and techniques developed and described in detail by Heath et al. (1996, 1997). Once the SST is inserted, the gas is terminated and the animal inhales pure oxygen until recovery (indicated by a gag reflex). The endotracheal tube is removed and the animal completes recovery (indicated by aggressive response to tapping on the flippers or rump). Gassed seals will be held until the animal has regained full response and is able to reenter the water on its own. If deemed necessary due to low ambient temperatures, an insulated mat will be placed under the seal to reduce heat loss to the substrate. Isoflurane reduces stress on animals and decreases the amount of time the animal is held. We will use equipment and techniques developed and described in detail by Heath et al. (1996, 1997). This technique has been used extensively on captive, rehabilitated and wild-caught pinnipeds, including harbor seals, Steller sea lions and California sea lions. It has been used for surgical procedures that require a pinniped to be anesthetized (e.g., gastric lavage, endoscopy, radiographs, implantation of telemetry devices, and biopsy) as well as for branding and ultrasound. Gas anesthesia will be administered and monitored only by personnel thoroughly trained in its application and overseen by a veterinarian, veterinary technician or personnel thoroughly trained in its application.

This technique was used successfully on 32 grey seals from Sable Island, Nova Scotia with 29 recorders recovered (4 animals did not return, but the HTR from one of those animals was recovered) (Austin et al. 2006a). The

STTs were retained for 2-40 days (mean 16.3 SD 2.67 days/seal) in the stomach and no significant differences were found in dive variables, mass gain, or body mass at arrival to the breeding colony between seals carrying only TDR packages with those carrying both TDR and STT packages. Austin et al. (2006a) concluded that STTs overall had no negative effect on the foraging behavior of their study animals. HTR and SSTs will be deployed on no more than 20 animals per year.

The total weight of the HTR package (base plate, HTR, syntactic foam, VHF transmitter, and zinc link) is 370 g. Harbor seals with HTRs will also have SPOT tags (30 g) and TDRs (300-500 g, depending on model used). Thus total maximum tag weight would be 900 grams. Austin et al. deployed HTRs that were 650 g in combination with TDRs, which weighed between 65-300 g depending on the model used for a total possible tag weight of 950 g on grey seals. We considered the proportionally smaller body size of harbor seals than grey seals and made every effort to reduce the size of the instrument packages, however the size and weight are dictated by the manufacturer in addition to the foam necessary for floatation and recovery. We will outfit only adult animals >60 kg with this tag combination, which would constitute < 0.67 % of animal's body mass.

Seals receiving a STT will have only 3 instruments attached: a HTR which includes a VHF , Satellite and TDR. They will not receive an independent VHF tag.

Up to 10 per cent of all captured harbor seals may be recaptured in a given year. If the recapture occurs > 4 months after the original capture, the animals may be resampled or reinstrumented.

California sea lions.

Capture/markings.--Floating trap capture techniques for California sea lions have been used since 1989 and are described in detail in NMFS (1996) and NMFS and WDFW (1995). Traps consist of a floating platform surrounded by steel mesh or chain link fencing. Sea lions freely enter and exit capture cages via a trap door, which is opened and closed vertically and is manually closed by a researcher. Captured sea lions are processed on a barge built specifically to work on adult and sub adult California sea lions. The barge is mated to the trap and sea lions are transferred from the trap onto the barge through a gate opposite the trap door. The barge has three cages used to hold sea lions during different stages of processing. Animals are moved through the process using noise (e.g., striking a stick on the platform deck or cage wall). One to three animals might be held in the first "holding" cage before entering the second cage which rests on a platform scale. Sea lions are weighed in the second "weight" cage before being moved into the final "squeeze" cage which restrains the animals for marking. The squeeze cage is fitted with removable bars to gain access to the sea lion's mid-rump for application of a permanent hot brand. Branding irons are made of cold-rolled steel (approximately 10mm stock); the dimensions of the largest digits are approximately 5 cm wide and 8cm high. Each iron is heated red-hot in a portable, propane-fired forge and applied perpendicularly to the animal's shoulder with light, even pressure (ca. 5 psi) for 2-4 seconds. Digits are 4-5 cm apart to insure clarity of numbers. Adult sea lions are branded without anesthesia because they are able to be restrained efficiently and safely (for both animals and researchers) using the squeeze cage. Since 1989, NMML and ODF&W have captured and handled 2,958 California sea lions in the Pacific Northwest of which approximately 1,880 have been branded. Only about 20 of these sea lions were branded using anesthesia. Six sea lions died during the handling process (out of 2,958 handled) and 2 of these were anesthetized. Using anesthesia for branding sea lions increases handling time 4-5 times because of the time required for induction and recovery. This leads to additional stress on the animal which could lead to increased mortality. Branding of sea lions without using anesthesia is more humane because the animals are released within 10 minutes of entering the squeeze cage, thereby reducing stress.

While in the squeeze cage animals are measured (length and girth) and fitted with numbered tags on each flipper. Brightly colored neoprene patches are attached with epoxy for an additional, temporary means of identification. Processing time for each individual animal, from entering the squeeze to release, is 7-10 minutes. Animals fitted with external telemetry instruments take an additional 20-30 minutes to attach. Maximum holding time is 4 hours. The maximum holding time is a function of how many sea lions are captured, their handling time and the time required to set up for handling. The average handling time for newly captured sea lions which are not instrumented is about 10 min and it takes about 1 hour to set up for handling which includes positioning the barge and cages and transferring animals from the trap onto the barge. It also takes 2-3 minutes to bring a new sea lion into the squeeze cage for handling. The time required for capture and handling of 12 new sea lions would be about 4 hours. If sea lions are instrumented with VHF or satellite tags, the handling time increases to 20-30 min per animal but generally no more than 3-4 sea lions would be instrumented on any given day. The maximum expected holding time for captures is 4 hours since most captures involve recaptured sea lions which can be handled in 4-5 min.

Telemetry instruments include very high frequency (VHF) transmitters (e.g., 23-92 grams, dimensions vary; Advanced Telemetry Systems, Isanti, MN), satellite-linked transmitters (e.g., 100 grams, approximately 3-in x 5-in x 1-in, Kiwisat 101, Sirtrack, New Zealand), or sonic tags (e.g., 9 g, 16 by 55 mm, 69 kHz, 152 dB re 1 lPa at 1 m; Vemco, Nova Scotia, Canada). Instruments are attached to the hair on the animal's back just over the shoulders with epoxy. Tracking will be by passive and active receiver systems; satellite tags will be monitored by Argos, Inc. Duration of tags will be no more than one year (due to annual molt).

There are two general types of takes in this category, based on whether the animal is a new, unbranded animal, or a recapture of a previously branded animal. Up to 300 newly captured animals will be branded annually in addition to being weighed, measured, and given a temporary patch; an additional 50 of newly captured sea lions will receive external instruments (no more than three instruments per animal) as well as brands. Up to 50 of the newly captured animals will also be branded and their blood drawn for disease screening. Up to 150 previously branded animals may be recaptured at which time they will be weighed and measured, if patches and/or flipper tags have been lost, they will be replaced. An additional 50 previously captured animals will receive external instruments (no more than three instruments per animal) Previously branded animals are occasionally caught more than once per year.

Blood sampling. As many as 50 sea lions may have blood collected per year for health screening purposes. Blood samples will be collected during capture operations and will be taken to test for presence of pathogens by serology, culture and isolation. Blood samples will be taken for stable isotope analysis, blood chemistry, immunology, as well as screening for parasites and disease: brucellosis, leptospirosis, influenza virus, calicivirus, herpes virus, morbillivirus, Toxoplasma gondii, Sarcocystis neurona and Neospora spp. and any other newly identified organisms of concern.

Not more than 1.0 ml blood per kg body mass per capture event will be taken from adult or subadult sea lions and the amount will not exceed 45 ml of blood (i.e., if an animal weighs 45 kg we will take up to 45 ml of blood, if an animal weighs 100 kg we will take up to 45 ml of blood). Blood will be taken from the caudal gluteal vein using the vacutainer system. This is a standard method for sampling blood from California sea lions (Dierauf and Gulland 2001). Needle insertions will not exceed 3 attempts per site per capture event. Additional sites that would be attempted for drawing blood would be from a vein in the hind flipper or extradural intervertebral sinus.

If whole blood is collected for hematology, it will be kept cool and submitted to Phoenix Laboratory. Whole clotted blood will be kept on ice after collection; centrifuged in the lab and serum will be extracted and then frozen immediately pending shipment to appropriate laboratories. At least 2 ml of serum aliquot may be stored at NMML for archival purposes.

Serum may be submitted for analysis of serum chemistry, disease screening, and immunology to laboratories including: Phoenix Laboratory, Animal Health Center, Department of Fisheries and Oceans, University of California, Davis, Washington Department of Agriculture, Washington Animal Diagnostics Laboratory, National Veterinary Service Laboratory, National Institute of Health, and Oklahoma State Animal Diagnostic Laboratory.

Instruments – Satellite, Time depth recorders, VHF radio tags, acoustic tags. We will instrument subadult and adult California sea lions to describe their foraging behavior. The instruments will be satellite tags, time depth recorders (TDR), VHF radio tags, or acoustic tags deployed alone or in combination (no more than 3 instruments on an animal). Each of these tags offers a different view of how the animals use their habitat and the characteristics of the habitat. We plan to instrument up to 100 California sea lions per year; individuals may be recaptured and handled for TDR or satellite tag removal.

VHF radio transmitters will be attached to temple cattle ear tags (51 x 16 x 26 cm; total weight up to 35 grams) and applied to the hind flippers or attached directly to pelage using adhesives (Devcon 5-minute epoxy or Loctite Super Bonder 422 or similar adhesive). TDR units will be comparable to models manufactured by Wildlife Computers, Redmond, WA. They are 2.9 cm in diameter and 15.4 cm long, and do not exceed 196 grams in weight. TDRs will be applied to the pelage using adhesive. Satellite-linked transmitters will be comparable to models manufactured by Wildlife Computers, Redmond, WA. The transmitter used for California sea lions will be 0.5 watts (9 x 14 x 3 cm; up to 450 g.). Acoustic tags (e.g., V16: 9 g, 16 by 55 mm, 69 kHz, 152 dB re 1 IPa at 1 m; Vemco, Nova Scotia, Canada) will be attached directly to pelage using adhesives (Devcon 5-minute epoxy or Loctite Super Bonder 422 or similar adhesive). These application techniques have been used successfully on a variety of pinnipeds, including harbor seals, California sea lions and northern elephant seals (Stewart et al. 1989, DeLong and Stewart 1991, Wright et al. 2007). Attachment of instruments to the pelage with adhesives was developed by the principal researchers and allows for the loss of instrument packs during the annual molt.

Testing killer whale vocalizations The behavioral responses of California sea lions to underwater playbacks of killer whales will be tested at various locations in the Pacific Northwest including Shilshole Bay, Everett, Ballard Locks, Neah Bay and East Bodelteh Island in Washington, and at Bonneville Dam, Astoria, Rogue River, and the lower Columbia River near Astoria in Oregon. Three types of killer whale vocalizations will be tested including local mammal eating calls (transients), local fish eating calls (residents) and Alaska (unfamiliar) killer whale calls. Test criteria will include distance and change in distance from the sound source, number and proportion of sea lions surfacing, and flight response. Each playback test will be filmed with video cameras to record visual responses. Playbacks will be conducted using a TCD-D8 DAT- recorder and an LL916 underwater speaker deployed at a depth of approximately 5 m from a small boat anchored 100 m from a sea lion haulout site. The maximum source level of the loudest calls is expected to be about 148 dB (reference pressure 1 ?Pa at 1m) (Deecke et al. 2002). The number of sea lions in the water will be counted and the distance of the sea lions to the sound source will be determined using laser rangefinders for at least 2 min preceding any playbacks. The playback sequence will last 1 min and the same test criteria will be measured during and after the playback for 2 more min. The frequency range of broadcasts will be between 10 – 22 kHz. The signals are digitized and will be centered at 22 kHz (Deecke et al. 2005). The total number of one-min playbacks per day will not exceed 10 per location and up to 2 locations may be tested per day. The average number of sea lions at each location subject to playback trials is expected to be 15. It is expected the project can be completed in 10-12 days.

To mitigate against takes of killer whales during playback experiments, we will institute a simple observer system of scanning for killer whales and conducting passive acoustic monitoring for 30 minutes before any playback experiments. If killer whales are present we will not initiate playback experiments.

Elephant Seals Up to 50 northern elephant seals may be captured, marked and tagged in Washington and Oregon annually. Capture and tagging activities are expected to occur primarily at Cape Arago, the Columbia River, Destruction Island, Protection Island, and Dungeness Spit, but elephant seals in other areas may also be captured.

Individuals will be physically restrained by use of a hoop net or head bag; they will be sexed, measured, marked with dye, tagged and released. Eight elephant seal pups were born at Cape Arago, Oregon in 1997. In addition, we will tag non-pups opportunistically to determine stability of the population. Elephant seals will be tagged with jumbo roto Dalton ear tags, similar to those placed on harbor seals. They will be tagged while sleeping or while being restrained physically. They may be marked by hair dye, or colored neoprene patches applied with epoxy or Loctite.

Supplemental Information

Status of Species:	<div>a. The target species are the Washington and Oregon coastal stock and the Washington inland stock of harbor seals (<i>Phoca vitulina</i>), the U.S. stock of California sea lions (<i>Zalophus californianus</i>) and the California stock of northern elephant seals (<i>Mirounga angustirostris</i>).</div> <div>b. Non-target species that may be affected incidentally by our research are Steller sea lions (<i>Eumetopias jubatus</i>) and southern resident killer whales (<i>Orcinus orca</i>). During aerial, and boat of harbor seals, California sea lions and northern elephant seals, it is possible that we may incidentally harass up to 250 Steller sea lions annually. During playback of killer whale calls to detect responses from California sea lions, it is possible that we may incidentally harass up to 100 southern resident killer whales annually. Takes may occur in Everett, Shilshole, Neah Bay, Bodelteh, Rogue River and the lower Columbia River.</div>
Lethal Take:	<div>If serious injury occurs during captures that will likely result in death, the animal will either be sent to a rehabilitation facility or humanely euthanized.</div> <div>There is a potential for injury or unintended mortality during harbor seal, California sea lion, or elephant seal captures but we believe it to be negligible. Some proportion of captured harbor seals, sea lions or elephant seals may be sick or already injured and thus may die during capture or restraint. We request up to 5 harbor seal incidental mortalities per year, up to 5 California sea lion incidental mortalities per year, and up to 2 elephant seal mortalities per year.</div>

Anticipated Effects on Animals:	<p>a. The capture, handling, sampling, marking and instrumentation of harbor seals, California sea lions and northern elephant seals may cause temporary stress and discomfort to individuals during the activities. However, because we have subsequently resighted and/or recaptured healthy, unharmed, marked animals, these procedures are not believed to cause harmful or long-term stress, discomfort, pain or injury.</p> <p>b. Non-target species that may be affected are Steller sea lions and killer whales. Up to 250 Steller sea lions may be incidentally taken up to 20 times during aerial and boat surveys of harbor seals, California sea lions and elephant seals. Up to 100 southern resident killer whales may be incidentally taken up to 2 times during playback experiments on California sea lions.</p> <p>c. All of the methods outlined in this application have been used to handle pinnipeds for many years and the researchers have many years of experience handling pinnipeds. Capture techniques for harbor seals have been used since 1978 and are described in Jeffries et al. (1993). Capture techniques for California sea lions have been used since 1989 and are described in NMFS (1996) and NMFS and WDFW (1995). Northern elephant seals will be captured and physically restrained by using a hoop net or head bag. No mortalities have occurred. However, there is a potential for injury or unintended mortality during harbor seal, California sea lion, or elephant seal captures but we believe it to be negligible. Some proportion of captured harbor seals, sea lions or elephant seals may be sick or already injured and thus may die during capture or restraint. To date, the mortality rate during captures for harbor seals is ~0.008 (24/2979) and for California sea lions is ~ 0.0037 (11/2958), and 0.0 (0/20) for northern elephant seals. Past causes of mortality include: over-restraining, heat stress, aggression-caused hyperthermia, respiratory complications during anesthesia and drowning through entanglement in the capture net, pre-existing disease-related complications, and capture myopathy. Changes to protocols (e.g., altered squeeze cage, increased monitoring, wetting down of animals during holding period) subsequent to past mortality events make it unlikely that animals in the future would die due to over-restraining or hyperthermia but disease-related complications and capture myopathy are always potential mechanisms of mortality.</p>
Measures to Minimize Effects:	<p>Aerial, boat, and ground surveys: Aerial surveys will be flown at a minimum of 500 feet altitude (typically 600-800 feet) and at a speed of 80 to 100 knots in a fixed-wing, single engine aircraft. Vessel surveys in Washington and Oregon waters will be conducted from small power boats (15 to 26 ft) for brand reading and assessment. Boats will approach close enough to read tags and marks of harbor seals, California sea lions and Steller sea lions without disturbing them. Ground surveys will be conducted from cover of blinds, docks, rocks or sand dunes for brand reading or assessment surveys of harbor seals, California sea lions, and northern elephant seals. The principal researchers have extensive experience in conducting aerial, boat, and ground surveys of these species, and we anticipate that harassment of very few individuals will actually occur during most assessment surveys. Between 1984 and 2007 harassment occurred on only 20% of all aerial surveys and caused less than 5% of the pinnipeds on shore to go into the water (data from WDFW and ODFW survey logs). On aerial surveys efforts to reduce disturbance include slow flight, low power settings, and other noise reduction techniques. Vessel disturbance will be kept to a minimum by slow approach and reducing engine noise or turning engine off. Disturbance from ground counts will be kept to a minimum by stealth (maintaining a low profile and observing quietly from downwind).</p> <p>Capture and restraint: Capture operations will use methods previously developed to successfully capture and handle harbor seals in California, Oregon, Washington, and British Columbia (Beach et al. 1985, Allen 1988, Harvey 1987, Stein 1989, Huber 1995, Jeffries et al. 1993). The primary method of capture will be by beach seine deployed from boats. Additional animals may also be captured by hoop net. Details of these methods have been described in Jeffries et al. (1993). Once captured, each seal will be held in an individual hoop net for up to 3 hours until processed and released. During all captures and handling, all pinnipeds are handled as quickly as is safe for the animals and biologists. Efforts are made to reduce stress by not walking in front of animals during restraint, handling them humanely, and releasing them as quickly as possible. Capture, tissue sampling, and branding or tagging wild animals may cause minor stress or pain during the activity, but the effects are not prolonged. This technique allows the minimum amount of disturbance on haul out and rookery areas to achieve the desired sample sizes and has been quite safe for harbor seals. Harbor seal capture operations may occur during the pupping season, consequently, unweaned pups may be caught. All care is taken that unweaned pups and nursing females are the first animals released. Released unweaned pups are observed until reunited with their mothers. To date, we have never observed a female and pup to remain separated as a consequence of our capture operations. Northern elephant seals may be approached during the winter breeding season but we do not expect that captures will affect bonding between females and pups.</p> <p>Playback experiments: To mitigate against killer whale takes, we will institute a simple observer system of scanning for killer whales and conduct passive acoustic monitoring for 30 minutes prior to any playback experiments. If killer whales are present we will not initiate playback experiments.</p> <p>If our activities result in orphaning of pups, the NW Region stranding coordinator will be notified and the pups will be sent to rehabilitation at authorized facilities (PAWS Wildlife or Wolfhollow) or euthanized and samples collected for disease studies. If serious injury occurs during captures that will likely result in death, the animal will either be sent to a rehabilitation facility or humanely euthanized. Animal disposition would be determined by on site PI or CIs of this permit, in consultation with veterinarians and rehabilitation facilities. Any mortalities resulting from euthanizing a seriously injured animal would be counted as an incidental mortality.</p> <p>Euthanasia will be by lethal intravenous injection of sodium pentobarbital at 3 cc/4.5 kg body mass for the first 4.5kg (10lbs) and then 1 cc for each additional 4.5 kg of body mass. This is standard protocol for euthanizing domestic animals. Euthanizing is a humane way to relieve them from a more painful death.</p>

Observations of branded or instrumented animals show routine behavior after handling and indicate that animals return to normal behavior within 15-30 minutes of handling and exhibit little sign of pain or stress. Health evaluation of branded animals indicates that brands are healed completely within 3 to 6 months and branding does not negatively impact growth of pups (NMFS and OPR 1993). Permanent marks are necessary to obtain information on survival, reproduction, migration and movements for use in population models of harbor seals and California sea lions that will be applicable for management of these species. Currently, no other effective method of permanent marking for pinnipeds is available (NMML and OPR 1993). Flipper tags and Passive-Integrated Transponders (PIT tags) are not effective marking methods for harbor seals or California sea lions because flipper tags are too small to read from a distance and PIT tags require contact with the animal to provide an identity. Branding has provided the first estimates of survival and reproductive information on California sea lions (Melin et al. 1998, Laake et al. 1999) and harbor seals (Huber et al. 2002) needed for population models which is the primary objective of the marking program.

Disposition of Tissues: Blubber samples may be exported to Peter Ross (DFO, Sydney, British Columbia, Canada V8L 4B2) for contaminant analysis. Harbor seal skin and blubber tissues may be imported from Canada for genetics and contaminant and fatty acid analysis. Import and Export of tissues is covered under CITES permit # 07US694250/9 issued to NMML.

Public Availability of Product/Publications:	Ultimately the results will be published in peer-reviewed publications. In the near-term, results will be available in annual reports to F/PR and in state and federal agency reports.
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Location

Sale in Oregon of species taken: None

Location Description: pinniped haulouts in coastal Oregon and Washington

Take Information

Line	Ver	Species	Listing Unit/Stock	Production /Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
1		Seal, harbor	Range-wide	Wild	All	Male and Female	30000	30	Harass	Other	Incidental disturbance	N/A	2/18/2010	9/30/2013
		Details: harass incidental to aerial. ground and boat surveys												
2		Sea lion, California	US Stock	Wild	Non-Pup	Male	8000	30	Harass	Other	Incidental disturbance	N/A	2/18/2010	9/30/2013
		Details: harass incidental to aerial. ground and boat surveys												
3		Seal, northern elephant	California Breeding Stock	Wild	All	Male and Female	100	30	Harass	Other	Incidental disturbance	N/A	2/18/2010	9/30/2013
		Details: harass incidental to aerial. ground and boat surveys												

4		Seal, harbor	Range-wide	Wild	All	Male and Female	20000	30	Harass	Other	Incidental disturbance	N/A	2/18/2010	9/30/2013
		Details: harass during captures, scat collection, and dead pup surveys												
5		Sea lion, California	US Stock	Wild	Non-Pup	Male	8000	30	Harass	Other	Incidental disturbance	N/A	2/18/2010	9/30/2013
		Details: harass during captures and scat collections												
6		Seal, northern elephant	California Breeding Stock	Wild	All	Male and Female	100	30	Harass	Other	Incidental disturbance	N/A	2/18/2010	9/30/2013
		Details: harass during captures and scat collections												
7		Seal, harbor	Range-wide	Wild	All	Male and Female	160	1	Capture/Handle/Release	Net, Hoop	Mark, flipper tag; Mark, hot brand; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, fecal swab; Sample, nasal swab; Sample, oral swab	N/A	2/18/2010	9/30/2013
		Details: except pups less than 20 kg and near term females												
8		Sea lion, Steller	East of 144° Long (Eastern US)	Wild	All	Male and Female	250	20	Harass	Survey, aerial	Incidental disturbance	N/A	2/18/2010	1/31/2020
		Details: also disturb during vessel surveys												
10		Seal, harbor	Range-wide	Wild	All	Male and Female	20	2	Capture/Handle/Release	Net, Hoop	Mark, flipper tag; Mark, hot brand; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Weigh	N/A	2/18/2010	1/31/2020
		Details: except pups less than 20 kg and near term females; other procedure is urogenital swab												
11	C	Seal, harbor	Range-wide	Wild	All	Male and Female	20	1	Capture/Handle/Release	Net, Hoop	Anesthesia, injectable sedative; Mark, flipper tag; Mark, hot brand; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, nasal swab; Sample, ocular swab; Sample, other; Weigh	N/A	1/30/2015	1/31/2020
		Details: except pups less than 20 kg and near term females; other procedure is swab urogenital; with Valium or midazolam/flumazenil												
12		Seal, harbor	Range-wide	Wild	All	Male and Female	50	1	Capture/Handle/Release	Net, Hoop	Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Weigh	N/A	2/18/2010	1/31/2020
		Details: except pups less than 20 kg and near term females; other procedure is swab urogenital												
13		Seal, harbor	Range-wide	Wild	pup	Male and Female	25	1	Capture/Handle/Release	Net, Hoop	Mark, flipper tag; Mark, hot brand; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, skin biopsy; Weigh	N/A	2/18/2010	1/31/2020
		Details: pups greater than 20 kg; other sample is swab utogenital												
14		Seal, harbor	Range-wide	Wild	pup	Male and Female	50	1	Capture/Handle/Release	Net, Hoop	Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, skin biopsy; Weigh	N/A	2/18/2010	1/31/2020
		Details: other sample is swab utogenital												

15		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	60	1	Capture/Handle/Release	Net, Hoop	Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: adult and subadult except near term females; other sample is urogenital swab												
16	C	Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	7	1	Capture/Handle/Release	Net, Hoop	Anesthesia, injectable sedative; Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	1/30/2015	1/31/2020
		Details: subadult and adult except near term females; other sample is urogenital swab; with Valium or midazolam/flumazenil												
17		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	8	2	Capture/Handle/Release	Net, Hoop	Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: subadult and adult; other sample is urogenital swab												
18		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	11	1	Capture/Handle/Release	Net, Hoop	Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: subadult and adult except near term females; other sample is urogenital swab												
19	C	Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	2	1	Capture/Handle/Release	Net, Hoop	Anesthesia, injectable sedative; Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	1/30/2015	1/31/2020
		Details: subadult and adult except near term females; other sample is urogenital swab; with Valium or midazolam/flumazenil												
20		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	2	2	Capture/Handle/Release	Net, Hoop	Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: subadult and adult except near term females; other sample is urogenital swab												
21		Seal, harbor	Range-wide	Wild	All	Male and Female	75	1	Capture/Handle/Release	Net, Hoop	Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Mark, hot brand; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Weigh	N/A	2/18/2010	1/31/2020
		Details: except pups less than 20 kg and near term females; other procedure is swab urogenital												

22		Seal, harbor	Range-wide	Wild	All	Male and Female	40	1	Capture/Handle/Release	Net, Hoop	Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Weigh	N/A	2/18/2010	1/31/2020
		Details: except pups less than 20 kg and near term females; other procedure is swab urogenital												
23		Seal, harbor	Range-wide	Wild	All	Male and Female	35	1	Capture/Handle/Release	Net, Hoop	Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: except pups less than 20 kg and near term females; other procedure is swab urogenital												
24		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	40	1	Capture/Handle/Release	Net, Hoop	Instrument, external (e.g., VHF, SLTDR); Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: subadult and adult greater than 30 kg, except near term females; other sample is urogenital swab; no more than 3 instrumets per animal (satellite, VHF, TDR, or acoustic)												
25	C	Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	5	1	Capture/Handle/Release	Net, Hoop	Anesthesia, injectable sedative; Instrument, external (e.g., VHF, SLTDR); Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	1/30/2015	1/31/2020
		Details: subadult and adult greater than 30 kg, except near term females; other sample is urogenital swab; no more than 3 instrumets per animal (satellite, VHF, TDR, or acoustic); with Valium or midazolam/flumazenil												
26		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	5	2	Capture/Handle/Release	Net, Hoop	Instrument, external (e.g., VHF, SLTDR); Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: subadult and adult greater than 30 kg, except near term females; other sample is urogenital swab; no more than 3 instrumets per animal (satellite, VHF, TDR, or acoustic)												
27		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	6	1	Capture/Handle/Release	Net, Hoop	Instrument, external (e.g., VHF, SLTDR); Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: subadult and adult greater than 30 kg, except near term females; other sample is urogenital swab; no more than 3 instrumets per animal (satellite, VHF, TDR, or acoustic)												

28	C	Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	2	1	Capture/Handle/Release	Net, Hoop	Anesthesia, injectable sedative; Instrument, external (e.g., VHF, SLTDR); Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	1/30/2015	1/31/2020
		Details: subadult and adult greater than 30 kg, except near term females; other sample is urogenital swab; no more than 3 instrumets per animal (satellite, VHF, TDR, or acoustic); with Valium or midazolam/flumazenil												
29		Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	2	2	Capture/Handle/Release	Net, Hoop	Instrument, external (e.g., VHF, SLTDR); Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: subadult and adult greater than 30 kg, except near term females; other sample is urogenital swab; no more than 3 instrumets per animal (satellite, VHF, TDR, or acoustic)												
30	C	Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	14	1	Capture/Handle/Release	Net, Hoop	Anesthesia, injectable sedative; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g., PIT); Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	1/30/2015	1/31/2020
		Details: subadult and adult greater than 60 kg, except near term females; other sample is urogenital swab; internal instrument is stomach temp sensor; no more than 3 external tags (satellite, TDR, VHF or stomach sensor); with Valium or midazolam/flumazenil												
31	C	Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	2	2	Capture/Handle/Release	Net, Hoop	Administer drug, IV; Anesthesia, gas w/cone or mask; Anesthesia, gas w/intubation; Anesthesia, injectable sedative; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g., PIT); Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (clip); Sample, vibrissae (pull); Weigh	N/A	1/30/2015	1/31/2020
		Details: subadult and adult greater than 60 kg, except near term females; other sample is urogenital swab; internal instrument is stomach temp sensor; no more than 3 external tags (satellite, TDR, VHF or stomach sensor); with Valium or midazolam/flumazenil												
32	C	Seal, harbor	Range-wide	Wild	Non-Pup	Male and Female	4	2	Capture/Handle/Release	Net, Hoop	Administer drug, IV; Anesthesia, gas w/cone or mask; Anesthesia, gas w/intubation; Anesthesia, injectable sedative; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g., PIT); Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	1/30/2015	1/31/2020
		Details: subadult and adult greater than 60 kg, except near term females; other sample is urogenital swab; internal instrument is stomach temp sensor; no more than 3 external tags (satellite, TDR, VHF or stomach sensor); with Valium or midazolam/flumazenil												

33		Seal, harbor	Range-wide	Wild	pup	Male and Female	75	1	Capture/Handle/Release	Net, Hoop	Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, skin biopsy; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: other sample is urogenital swab												
34		Seal, harbor	Range-wide	Wild	pup	Male and Female	15	1	Capture/Handle/Release	Net, Hoop	Mark, flipper tag; Mark, hot brand; Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: pups greater than 20 kg; other sample is urogenital swab												
35		Seal, harbor	Range-wide	Wild	Adult	Female	15	1	Capture/Handle/Release	Net, Hoop	Administer drug, IM ; Mark, dye or paint; Mark, flipper tag; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, hand; Sample, blood ; Sample, blubber biopsy; Sample, clip hair; Sample, fecal swab; Sample, milk (lactating females); Sample, nasal swab; Sample, ocular swab; Sample, other; Sample, vibrissae (pull); Weigh	N/A	2/18/2010	1/31/2020
		Details: lactating females; other sample is urogenital swab, injectable is oxytocin												
36	C	Sea lion, California	US Stock	Wild	Non-Pup	Male	300	1	Capture/Handle/Release	Trap, floating	Anesthesia, injectable sedative; Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, cage; Weigh	N/A	1/30/2015	1/31/2020
		Details: Valium or midazolam/flumazenil												
37	C	Sea lion, California	US Stock	Wild	Non-Pup	Male	50	1	Capture/Handle/Release	Trap, floating	Anesthesia, injectable sedative; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Mark, hot brand; Mark, other (e.g., neoprene patch); Measure (standard morphometrics); Restrain, cage; Weigh	N/A	1/30/2015	1/31/2020
		Details: no more than 3 instruments per animal (satellite, TDR, acoustic, VHF); with Valium or midazolam/flumazenil												
38	C	Sea lion, California	US Stock	Wild	Non-Pup	Male	50	1	Capture/Handle/Release	Trap, floating	Anesthesia, injectable sedative; Mark, dye or paint; Mark, flipper tag; Mark, hot brand; Measure (standard morphometrics); Restrain, cage; Sample, blood ; Weigh	N/A	1/30/2015	1/31/2020
		Details: Valium or midazolam/flumazenil												
39		Sea lion, California	US Stock	Wild	Non-Pup	Male	150	2	Capture/Handle/Release	Trap, floating	Measure (standard morphometrics); Restrain, cage; Weigh	N/A	2/18/2010	1/31/2020
40	C	Sea lion, California	US Stock	Wild	Non-Pup	Male	50	2	Capture/Handle/Release	Trap, floating	Anesthesia, injectable sedative; Instrument, external (e.g., VHF, SLTDR); Measure (standard morphometrics); Restrain, cage; Weigh	N/A	1/30/2015	1/31/2020
		Details: no more than 3 instruments per animal (satellite, TDR, acoustic, VHF); with Valium or midazolam/flumazenil												
41		Seal, harbor	Range-wide	Wild	All	Male and Female	100	1	Import/export/receive only	Net, Hoop	Import/export/receive, parts	N/A	2/18/2010	1/31/2020
		Details: Canada												
42		Sea lion, California	US Stock	Wild	Non-Pup	Male	4000	10	Harass	Other	Acoustic, active playback/broadcast; Observations, behavioral	N/A	2/18/2010	1/31/2020

		Details: subadult and adult; playback of killer whale vocalizations												
43		Seal, northern elephant	California Breeding Stock	Wild	All	Male and Female	50	1	Capture/Handle/Release	Net, Hoop	Mark, bleach ; Mark, flipper tag; Measure (standard morphometrics); Restrain, net; Sample, blood	N/A	2/18/2010	1/31/2020
44		Seal, harbor	Range-wide	Wild	All	Male and Female	5	1	Unintentional mortality	Other	Other; Unintentional mortality	N/A	2/18/2010	1/31/2020
		Details: mortality incidental to research; other procedure is intentional by euthanasia												
45		Sea lion, California	US Stock	Wild	All	Male and Female	5	1	Unintentional mortality	Other	Other; Unintentional mortality	N/A	2/18/2010	1/31/2020
		Details: mortality incidental to research; other procedure is intentional by euthanasia												
46		Seal, northern elephant	California Breeding Stock	Wild	All	Male	2	1	Unintentional mortality	Other	Other; Unintentional mortality	N/A	2/18/2010	1/31/2020
		Details: mortality incidental to other research; other procedure is intentional mortality by euthansia												

NEPA Checklist

- 1) If your activities will involve equipment (e.g., scientific instruments) or techniques that are new, untested,or otherwise have unknown or uncertain impacts on the biological or physical environment , please discuss the degree to which they are likely to be adopted by others for similar activities or applied more broadly.**
- The research contained in this application does not involve new, innovative, controversial, or experimental equipment or techniques.
- 2) If your activities involve collecting, handling, or transporting potentially infectious agents or pathogens (e.g., biological specimens such as live animals or blood), or using or transporting hazardous substances (e.g., toxic chemicals), provide a description of the protocols you will use to ensure public health and human safety are not adversely affected, such as by spread of zoonotic diseases or contamination of food or water supplies.**
- None of the activities will affect public health or safety of humans. When handling animals or processing samples, all appropriate safety apparel will be worn at all times. Disposable apparel (e.g. latex gloves) will be discarded appropriately. Biologists will uphold good hygienic practices in the field and laboratory. Samples to be sent to laboratories or other facilities for analyses will be stored in secure containers which will then be placed in additional secure packaging marked with appropriate labeling. First aid and trauma kits with appropriate medications are maintained in the field.
- 3) Describe the physical characteristics of your project location, including whether you will be working in or near unique geographic areas such as state or National Marine Sanctuaries, Marine Protected Areas, Parks or Wilderness Areas, Wildlife Refuges, Wild and Scenic Rivers, designated Critical Habitat for endangered or threatened species, Essential Fish Habitat, etc. Discuss how your activities could impact the physical environment, such as by direct alteration of substrate during use of bottom trawls, setting nets, anchoring vessels or buoys, erecting blinds or other structures, or ingress and egress of researchers, and measures you will take to minimize these impacts.**
- The locations where the activities will take place are of special importance to marine mammals as breeding and resting areas but none of the activities will change the characteristics of the habitat or use of the locations by marine mammals.
- 4) Briefly describe important scientific, cultural, or historic resources (e.g., archeological resources, animals used for subsistence, sites listed in or eligible for listing in the National Register of Historic Places) in your project area and discuss measures you will take to ensure your work does not cause loss or destruction of such resources. If your activity will target marine mammals in Alaska or Washington, discuss measures you will take to ensure your project does not adversely affect the availability (e.g., distribution, abundance) or suitability (e.g., food safety) of these animals for subsistence uses.**
- None of the activities will cause loss or destruction of significant scientific, cultural, or historic resources.
- 5) Discuss whether your project involves activities known or suspected of introducing or spreading invasive species, intentionally or not, (e.g., transporting animals or tissues, discharging ballast water, use of equipment**

at multiple sites). Describe measures you would take to prevent the possible introduction or spread of non-indigenous or invasive species, including plants, animals, microbes, or other biological agents.

None of the activities will result in the introduction or spread of non-indigenous or invasive species.

Project Contacts

Responsible Party: John Bengtson

Primary Contact: Harriet Huber

Principal Investigator: Robert DeLong

Other Personnel:

Name	Role(s)
Robin F Brown	Co-Investigator
Patrick Gearin	Co-Investigator
Merrill E. Gosho	Co-Investigator
Jan Hodder	Co-Investigator
Harriet Huber	Co-Investigator
Steven J Jeffries	Co-Investigator
Susan Riemer	Co-Investigator
Matthew J Tennis	Co-Investigator
Bryan Wright	Co-Investigator

Attachments

Application Archive - P13430T14Issued.pdf (Added Feb 18, 2010)

Contact - Matthew J Tennis: C13423T5CV-Tennis v 2-13-09.pdf (Added Sep 4, 2009)

Contact - Merrill E. Gosho: C11143T5Gosho CURRICULUM VITAE.doc (Added May 1, 2009)

Contact - Patrick Gearin: C6194T5Gearin CURRICULUM VITAE.doc (Added May 1, 2009)

Contact - Robert DeLong: C6190T5CV_DeLong.docx (Added Jan 3, 2011)

Contact - Robin F Brown: C5883T516991 Robin Brown_CV.docx (Added Feb 15, 2012)

Contact - Steven J Jeffries: C5908T516991 Steven Jeffries_CV.docx (Added Feb 15, 2012)

Lit Review - P13430T713430 amended lit rvw.doc (Added Sep 14, 2009)

Project Description - P13430T113430 Appendix 1 pinniped haulouts.doc (Added Sep 14, 2009)

References - P13430T1213430 references.doc (Added Sep 14, 2009)

Status

Application Status:	Application Complete		
Date Submitted:	June 11, 2008		
Date Completed:	August 26, 2009		
FR Notice of Receipt Published:	September 18, 2009	Number:	0648-xk26
Comment Period Closed:	October 19, 2009	Comments Received:	Yes
		Comments Addressed:	Yes
Last Date Archived:	January 31, 2015		

- **MMPA Research/Enhancement permit**
 - Current Status: Issued Status Date: February 18, 2010
 - Section 7 Consultation: Formal Consultation
 - NEPA Analysis: Environmental Assessment
 - Date Cleared by General Counsel: February 1, 2010
 - FR Notice of Issuance/Denial Published: February 24, 2010 Notice Number: 0648-xk26
 - Expire Date: January 31, 2020

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Modification Requests

Modifications Requested						
Number	Title	Description	Status	Date Submitted	Date Issued	Issued Version
1	French TV FCA film crew	A film crew from French TV FCA would like to join Harriet Huber, Steve Jeffries, and Dyanna Lambourn during a collaborative project of harbor seal observations by NMFS and WDFW for 2-4 days between 3-17 August 2011.	Issued	07/06/2011	07/08/2011	
		See attached memo for details				
2	NOAA Ocean Media Center film request	Paul Hillman from NOAA Ocean Media Center (OMC) would like to join Harriet Huber, Steve Jeffries, and Dyanna Lambourn during a collaborative project of harbor seal observations by NMFS and WDFW during the 2011 and/or 2012 pupping/breeding seasons.	Issued	07/19/2011	07/19/2011	
		See attached memo for details.				

3	request 5 year amendment with addition of injectable sedative	see attached memo	Application Complete	05/19/2014	01/30/2015
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Reports

Reports Required						
Nbr	Report Type	Report Period		Date Due	Status	Date Received
		Start Date	End Date			
1	Annual	02/17/2010	01/31/2011	05/01/2011	Submitted	05/02/2011
2	Annual	02/01/2011	01/31/2012	05/01/2012	N/A	
3	Annual	02/01/2012	01/31/2013	05/01/2013	N/A	
4	Annual	02/01/2013	01/31/2014	05/01/2014	N/A	
5	Annual	02/01/2014	01/31/2015	05/01/2015	N/A	
6	Final	02/17/2010	01/31/2015	08/01/2015	N/A	